



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the application of:

John E. Holland, et al

Docket: H27106

Serial Number: 10/616,790

Group Art Unit: 1771

Filed: July 10, 2003

Examiner: Arti Singh

For: Abrasion Resistant Sheet Material

BRIEF FOR APPELLANT

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This is an Appeal to the Board of Patent Appeals and Interferences from the Final Rejection of claims 1-28 mailed May 12, 2006 in the above identified case. A Notice of Appeal is being filed concurrently herewith. An oral hearing is not requested.

The Commissioner is authorized to charge the required Appeal Brief fee of \$500.00 to Deposit Acct. No. 01-1125. In the event that the Commissioner determines that an extension of time is required in order for this submission to be timely, it is requested that this submission include a petition for an extension for the required length of time and the Commissioner is authorized to charge any other fees necessitated by this paper to Deposit Acct. No. 01-1125.

07/18/2006 WASFAW1 00000019 011125 10616790

02 FC:1402 500.00 DA

## TABLE OF CONTENTS

	<u>Page No.</u>
1. REAL PARTY IN INTEREST .....	3
2. RELATED APPEALS AND INTERFERENCES .....	3
3. STATUS OF CLAIMS .....	3
4. STATUS OF AMENDMENTS .....	3
5. SUMMARY OF CLAIMED SUBJECT MATTER.....	3
6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL ...	6
7. ARGUMENT .....	6
8. CLAIMS APPENDIX .....	20
9. EVIDENCE APPENDIX.....	26
10. RELATED PROCEEDINGS INDEX.....	26

1. REAL PARTY IN INTEREST

The real party in interest is Honeywell International, Inc.

2. RELATED APPEALS AND INTERFERENCES

With respect to other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, please note that there are no other related applications on appeal or subject to an interference known to Appellant, Appellant's legal representative or the assignee.

3. STATUS OF CLAIMS

The claims in the application are 1-41. Claims 1-28 are pending, stand rejected and are on appeal. Claims 29-41 are withdrawn from consideration.

4. STATUS OF AMENDMENTS

A response to the final rejection was filed on May 25, 2006. Neither the claims nor the specification were amended. The Examiner determined that the reply failed to place the application in condition for allowance.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Numerous efforts have been advanced over the years to combat the abrasive wear and tear of items subject to abrasive contact with hard surfaces, or with moving matter such as water or flying debris (see p.1, lines 15-17). A number of sheet materials have been developed to wrap-around items to be protected or to cover exposed surfaces (see p.1,

lines 17-18). One application of such materials is in air cushion transport vehicles and air flotation devices of the type in commercial use today (see p.1, lines 21-22). An example of a vehicle of this type is an air cushion vehicle known as the HOVERCRAFT™ (see p.1, lines 25-26).

Air cushion vehicles typically include a skirt around the base, or rigid support frame, of the vehicle to enclose and form the air cushion (see p.2, lines 25-26). A particular problem with air cushion vehicle skirts is their susceptibility to damage and rapid deterioration due to constant impingement by water or foreign objects. When these vehicles are operated over land, the bottom edges of the skirts are subjected to severe abrasion and wear rapidly. Further, when used in a salt-water environment, rapid deterioration of the skirt material necessitates frequent replacement of the skirt after only a few operating hours, and at substantial costs. (see p. 2, lines 9-15).

The present invention is directed to an improved multi-layer sheet material that is highly abrasion-resistant, as well as cut and/or puncture-resistant (see p. 3, lines 17-18).

Particularly, the present invention claims an abrasion-resistant skirt material (see p. 1, lines 9-12) for use with air cushion vehicles having at least one air chamber, said skirt material comprising:

- (a) a woven fabric base, comprising yarns of an ultra-high molecular weight polyethylene (see p. 5, line 11 – p. 6, line 19);
- (b) a bonding layer, comprising a thermoplastic material bonded to the fabric base (see p. 5, lines 11-17; p. 6, line 20 – p. 7, line 18); and

(c) an outer layer, comprising a rubber compound bonded to the bonding layer (see p. 5, lines 11-17; p. 7, line 19 – p. 8, line 25).

The invention also claims a lightweight, abrasion-resistant sheet material (see p. 1, lines 9-12), comprising:

(a) a woven fabric base, comprising yarns of an ultra-high molecular weight polyethylene (see p. 5, line 11 – p. 6, line 19);

(b) a bonding layer, comprising a thermoplastic material bonded to the fabric base (see p. 5, lines 11-17; p. 6, line 20 – p. 7, line 18); and

(c) an outer layer, comprising a rubber compound bonded to the bonding layer (see p. 5, lines 11-17; p. 7, line 19 – p. 8, line 25).

While not previously appreciated, it has now been found that the thermoplastic film described in United States Patent No. 6,280,546 to Holland et al will bond to both ultra-high molecular weight polyethylene and to certain rubber compounds, materials that themselves do not have a bonding affinity for one another. In particular, it has been found that a rubber outer layer can be bonded to the thermoplastic film when subjected to the curing process described in detail hereinbelow. The resulting multi-layer sheet construction provides a highly durable protective sheet that will better withstand the wear and tear inherent in marine and over-ground applications for air cushion vehicles. (see p. 4, lines 14-22).

6. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

(a) Claims 1-28 stand rejected on the ground of non-statutory double patenting over U.S. patent application serial no. 10/359,796.

(b) Claims 1-28 stand rejected under 35 U.S.C. 103(a) over U.S. patent 3,966,012 to Crewe in view of U.S. patent 6,280,546 to Holland and further in view of U.S. patent 3,511,331 to Landry.

7. ARGUMENT

Claims 1-28 stand rejected on the ground of non-statutory double patenting over U.S. patent application serial no. 10/359,796.

It is respectfully urged that the presently claimed invention and the claims of 10/359,796 are patentably distinct and that the rejection is incorrect. Specifically, the present application claims:

1. An abrasion-resistant skirt **material** *for use with* air cushion vehicles having at least one air chamber, said skirt material comprising:
  - (a) a woven fabric base, comprising yarns of an ultra-high molecular weight polyethylene;
  - (b) a bonding layer, comprising a thermoplastic material bonded to the fabric base; and
  - (c) an outer layer, comprising a rubber compound bonded to the bonding layer.
  
15. A lightweight, abrasion-resistant sheet **material**, comprising:
  - (a) a woven fabric base, comprising yarns of an ultra-high molecular weight polyethylene;

- (b) a bonding layer, comprising a thermoplastic material bonded to the fabric base; and
- (c) an outer layer, comprising a rubber compound bonded to the bonding layer.

In contrast, co-pending application 10/359,796 claims:

1. In an air cushion vehicle, a **skirt assembly** having at least one air chamber formed by a rigid support structure and a depending skirt, the improvement wherein the skirt is formed from:

- (a) a structural base component, comprising:

- a lightweight, high-strength, abrasion-resistant woven fabric having inner and outer surfaces and made substantially from yarns that are formed from polymers of ultra-high molecular weight polyethylene having a tenacity of greater than 7 grams/denier, the fabric being resistant to degradation from saltwater, chemicals, and ultraviolet light; and

- (b) a fluid impermeable layer, comprising:

- a film bonded to at least one of the surfaces of the fabric to make the skirt substantially air and water impervious, the film selected from the group consisting of polyethylene and ethylene vinyl acetate.

As one can see, the claims are of considerable different scope from one another. The present application claims a three-layered sheet material that is fabric base/bonding layer/rubber compound containing layer. Co-pending serial no. 10/359,796 is not claiming a sheet material per se but rather a skirt assembly having an air chamber. The present application does not claim a structure having an air chamber. Co-pending serial

no. 10/359,796 is not claiming a three-layered sheet material that is fabric base/ bonding layer/rubber compound containing layer. Although it *uses* a fabric, the claims do not mention a fabric with a bonding layer nor an adjacent rubber compound containing layer. For these reasons one can see that the claims of the instant application are significantly different from, and would not be obvious over the claims of co-pending serial no. 10/359,796.

It is further respectfully submitted that the Examiner has already previously agreed with the Appellants that the present claims are distinguishable from the claims of 10/359,796, having withdrawn the double patenting rejection in the Office Action mailed August 29, 2005. The Examiner has since reinstated the double patenting rejection in view of amendments to claim 11 of USSN 10/359,796. However, it is respectfully asserted that the recent amendments to said claim 11 have not altered its scope. Co-pending serial no. 10/359,796 still claims a **skirt assembly** having an air chamber, and does not claim a skirt **material** or sheet **material** per se. The present application does not claim a structure having an air chamber. It is respectfully submitted that no amendments which were made to the claims of the present invention or the claims of USSN 10/359,796 necessitated the reinstatement of the prior double patenting rejection. For the foregoing reasons, it is respectfully submitted that this ground of rejection is incorrect and should be overruled.

Claims 1-28 stand rejected under 35 U.S.C. 103(a) over U.S. patent 3,966,012 to Crewe in view of U.S. patent 6,280,546 to Holland et al. and further in view of U.S. patent



3,511,331 to Landry. It is respectfully submitted that the rejection is incorrect and should be overruled.

The present invention claims an abrasion-resistant skirt material for use with air cushion vehicles having at least one air chamber, and also teaches a lightweight, abrasion-resistant sheet material. In each embodiment, the material comprises (a) a woven fabric base, comprising yarns of an ultra-high molecular weight polyethylene; (b) a bonding layer, comprising a thermoplastic material bonded to the fabric base; and (c) an outer layer, comprising a rubber compound bonded to the bonding layer. This structure is not taught or suggested by a combination of the cited references.

Crewe teaches an air cushion vehicle having a flexible skirt assembly, which skirt assembly includes a bag member 12 and a reticulated member 18. Bag member 12 is formed from sheet material 14, and reticulated member 18 is formed from fibrous strands or metallic wires to form a net. In contrast to the Examiner's assertion, Crewe does not teach that the sheet material 14 is coated with a natural or synthetic rubber. While Crewe does make a reference to the prior art stating that it has been known to manufacture a flexible material for air cushion vehicle skirts comprising a woven fabric coated with a rubber (see col. 1, lines 55-57), Crewe does not utilize rubber in association with their invention. Indeed, Crewe teaches away from a rubber coated fabric, describing it as undesirable for a skirt material (see col. 1, line 68-col. 2, line 3).

In teaching away from a rubber coated fabric, Crewe teaches an alternate structure including a bag member 12 and a reticulated member 18. In further contrast with the presently claimed invention, bag member 12 and reticulated member 18 are not bonded to each other. Rather, members 12 and 18 are attached to the rigid structure of the air cushion vehicle. Indeed, while reticulated member 18 does surround the outer surface of the bag member 12, member 12 and member 18 are not even in direct contact with each other, being separated by a buffer material 19 to prevent chafing of the bag member due to movement between members 12 and 18 (see col. 2, lines 27-32). Crewe describes that buffer 19 may be of a fibrous or foam construction, and buffer 19 is also not bonded to either of the bag member 12 or reticulated member 18. While, Crewe does not specifically state that buffer 19 is mandatory, they do not describe any embodiment that does not include the buffer 19. More importantly, because bag member 12 and reticulated member 18 are not bonded together, the absence of buffer 19 would result in undesirable chafing causing deterioration of the bag member. Accordingly, Crewe certainly teaches away from any skirt assembly having a bag member 12 and reticulated member 18 in contact with each other.

Crewe also fails to teach or suggest a skirt material comprising an outer rubber layer. Indeed, when applying the Landry reference, the Examiner acknowledges that Crewe fails to teach multiple coating layers. This appears to be an acknowledgement that Crewe fails to teach a rubber coated fabric. Even should one assume hypothetically that the fabric 14 of Crewe was rubber coated, the outer surface of bag member 12 is surrounded by the reticulated member 18. Accordingly, even when hypothetically assuming that fabric 14 is

coated with a rubber, and assuming that the hypothetical rubber and fabric 14 were bonded via a thermoplastic bonding layer, the skirt structure of Crewe would be the reverse of the claimed invention, failing to teach an outer rubber layer. It is respectfully submitted that one of ordinary skill in the art would not even look to Crewe to arrive at the presently claimed invention, let alone have a reasonable expectation of success in forming the present invention upon reading the disclosure of Crewe.

As the Examiner acknowledges, Crewe also fails to teach that their bag member 12 may be formed from yarns of an ultra-high molecular weight polyethylene. In order to fill this void, the Examiner has applied Holland, et al. It is respectfully submitted that Holland, et al is inapplicable both to the present invention as well as the Crewe reference.

Particularly, the Holland, et al reference makes no mention of a potential use of their material for an air cushion vehicle skirt. Rather, Holland, et al. relates to applications such as sail cloth, cargo container covers, side curtains for side-access trucks and bulk mail bags. Furthermore, like Crewe, Holland, et al does not pertain to structures having a rubber containing layer. Holland, et al pertains solely to a method for laminating a thermoplastic film to a high performance fabric, particularly without losing strength or degrading the high performance fiber. There is no teaching or suggestion or other appropriate nexus between Holland, et al. and Crewe allowing for the proposed combination of references. Accordingly, it is respectfully submitted that one skilled in the art would not look to Holland, et al. together with Crewe for the purpose of achieving the claimed invention.

As stated above, the Examiner acknowledges that Crewe fails to teach multiple coating layers, and applies Landry to fill this void. Landry teaches skirts for air cushion vehicles comprising at least two sheets of non-woven fibers coated on both sides by an elastomer such as rubber. Importantly, contrary to the Examiner's statement in the Office Action mailed May 12, 2006, Landry does not teach or suggest woven fabrics, which is a requirement of the claimed invention. See col. 2, lines 27-31 which states, "...the framework generally comprises at least two superimposed sheets or layers of flexible elements which are not woven and are substantially inextensible...". Moreover, the disclosure of Landry specifically teaches away from any use of woven fabrics to achieve their intended purposes. As recited on col. 3, lines 31-42,

if the skirt shown in Fig. 1 is made from a conventional woven fabric coated with an elastomer, the frame would be composed of the filaments of the fabric with intersect each other at right angles and which have a uniform spacing with respect to each other. This would not have been significant with respect to the sheet having flexible elements oriented as circles parallel to the bases of the truncated cone. However, the other sheet would not have flexible elements oriented according to the generatrices.

Accordingly, Landry states that lower mechanical resistance and substantial deformations are produced when using woven fabrics. In view of this disclosure, it is evident that Landry does not teach or suggest the use of woven fabrics in their skirt structures, but rather teaches away from it.

The fabrics of Landry also differ from the presently claimed invention in that they fail to teach or suggest a bonding layer between their fabric layer and the rubber layer on the fabric. As described at col. 3, lines 43-67, and col. 4, lines 42-60, the skirts of Landry

have a rubber/fabric/rubber/fabric/rubber structure, where adjacent fabric sheets are separated from each other by an elastomeric layer. Therefore, it is respectfully submitted that the Examiner has mistakenly interpreted Landry as including the claimed fabric layer/bonding layer/rubber layer structure taught by the Appellants, particularly where the fabric layer comprises a woven fabric.

In view of the significant differences between claimed invention and Crewe, Holland and Landry, and the significant differences between the applied references with each other, it is respectfully submitted that the claimed invention would not be obvious to one of ordinary skill in the art. In establishing a *prima facie* case of obviousness under 35 U.S.C. 103, it is incumbent upon the Examiner to provide a reason why one having ordinary skill in the art would have been led to combine references to arrive at the claimed invention. The requisite motivation must stem from some teaching, suggestion or interest in the prior art as a whole or from knowledge generally available to one having ordinary skill in the art. See *Uniroyal, Inc. v. Rudkin Riley, Corp.*, 837 F. 2d 1044, 5 USPQ 2d 1434 (Fed. Cir. 1988); *Ashland Oil, Inc. v. Delta Resin And Refractories, Inc.*, 776 F. 2d 281, 227 USPQ 657 (Fed. Cir. 1985). It is respectfully submitted that the applied references are devoid of such motivation.

Where claimed subject matter has been rejected as obvious in view of prior art references, a proper analysis under 35 U.S.C. 103 requires consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composite or device or carry out the claimed process; and (2) whether

the prior art would also have revealed that in so making or carrying out the claimed invention those of ordinary skill would have a reasonable expectation of success. See *In Re Dow Chemical Company* 837 Fed. 2d 469, 473, 5 USPQ 2d 1529, 1531 (Fed. Cir. 1988). Both the suggestions and the reasonable expectation of success must be found in the prior art, not in Appellants' disclosure.

Appellants respectfully assert that such a suggestion and/or reasonable expectation of success could not be found in the cited references. Neither Crewe, nor Holland, et al., nor Landry, taken singularly or in combination, teach or suggest the claimed subject matter, as argued above. The Patent and Trademark Office Board of Appeals and Interferences stated the following in *Ex parte Clapp*, 227 USPQ 972 (1985), at page 973:

Presuming arguendo that the references show the elements or concepts urged by the Examiner, the Examiner has presented no line of reasoning, and we know of none, as to why the artist when viewing only the collective teachings of the references would have found it obvious to selectively pick and choose various elements and/or concepts from the several references relied on to arrive at the claimed invention. In the instant application, the Examiner has done little more than cite references to show that one or more elements or some combinations thereof, when each is viewed in a vacuum, is known. The claimed invention, however, is clearly directed to the combination of elements. That is to say, the Appellants do not claim that they have invented one or more new elements but has presented claims to a new combination of elements. To support the conclusion of

the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed combination where the Examiner must present a convincing line of reasoning as to why the artist would have found the claimed invention to have been obvious in light of the teaching of the references.

With the above directives, consideration must be given as to whether the combination of references in the manner set forth in the Office Action is proper to render the Appellants' invention obvious in view thereof.

As set forth hereinabove, Appellants respectfully assert that the references do not teach or suggest the combination as set forth in the claims, as is evident from the plurality of differences between Appellants' invention and the cited art. Again, the combination of references must teach the claimed combination to render Appellants' claimed invention obvious under 35 U.S.C. 103. However, as discussed above, the applied references are very different than the claimed invention and very different than each other, and there is no proper support for the Examiner's proposed combination of references. Crewe fails to teach or suggest a skirt structure having a fabric base that is bonded to another layer via a thermoplastic bonding layer, or more particularly one that is bonded to an outer rubber layer. Moreover, Crewe directly teaches away from multiple layers which are bonded together. Crewe also fails to teach the use of ultra-high molecular weight polyethylene, which was not even invented yet at the time of Crewe's invention. Holland is inapplicable both to the present invention as well as the Crewe reference, makes no

mention of a potential use of their material for an air cushion vehicle skirt, and not pertaining to structures having a rubber containing layer. Landry fails to teach or suggest woven fabrics, fails to teach or suggest a bonding layer between their fabric layer and rubber layer, and also fails to teach the use of ultra-high molecular weight polyethylene, which was not even invented yet at the time of Landry's invention.

It is respectfully submitted that the Examiner has applied an improper standard of patentability. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Likewise, the belief that one skilled in the art could form the claimed multilayered film does not suggest that one should form such a film to obtain the disclosed benefits. The Examiner argues that sufficient motivation is present in the references to combine the Crewe, Holland, et al., and Landry references to form a composite with high strength and durability.

However, while said motivation is not present, in order to properly combine the references there must be motivation in the combined art to form such a material that achieves Appellants' intended goals, i.e. an abrasion-resistant skirt material for use with air cushion vehicles having at least one air chamber. Motivation for an intended desire is insufficient. In order to form a valid rejection the art must provide a motivation to take the specific action which the Appellants have take toward achieving an intended goal. Motivation or desire to achieve a stronger skirt material for use with air cushion vehicles is insufficient. The Examiner must present prior art which suggests making the



modifications made by the Appellants toward achieving a skirt material for use with air cushion vehicles. This motivation simply is not present in the applied art.

It is respectfully submitted that the Examiner is reconstructing the art in light of Appellants' disclosure. The point in time that is critical for an obviousness determination is at the time the invention. "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983). Obviousness cannot be established by hindsight combination to produce the claimed invention. *In re Gorman*, 933 F.2d 982, 986, 18 USPQ2d 1885, 1888 (Fed.Cir.1991). It is the prior art itself, and not the Appellants' achievement, that must establish the obviousness of the combination. It is urged that one skilled in the art would not be imbued with an inspiration to form the claimed structure and the materials with the claimed structural layers upon a reading of the Crewe, Holland, et al and Landry references.

Appellants submit that the Examiner is looking beyond the teachings of the references and is imposing an improper "**obvious to try**" standard of patentability. In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip*

*Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schneck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983). It is respectfully asserted that the invention as a whole would not have been obvious to one of ordinary skill in the art at the time the invention was made.

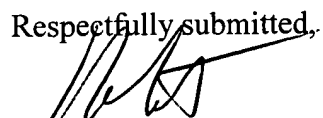
Again, to support the conclusion of the claimed combination is directed to obvious subject matter, the references must expressly or impliedly suggest the claimed combination where the Examiner must present a convincing line of reasoning as to why the artist would have found the claimed invention to have been obvious in light of the teaching of the references. However, the Examiner has done little more than cite references to show that one or more elements or some combinations thereof, when each is viewed in a vacuum, is known. The Examiner has failed to show how the Appellants' new combination of elements is obvious based on a combination of the applied references.

It is respectfully urged that one skilled in the art would not be imbued with an inspiration to form the claimed structure and the materials within the claimed structural layers upon a reading of the Holland, et al and Landry references together with Crewe.

For all the above reasons, claims 1-28 are urged to be patentable over the cited references and patentably distinct over the claims of USSN 10/359,796. Accordingly, it is respectfully submitted that the non-statutory double patenting rejection and the 35 U.S.C.

103(a) rejection are improper and should be overruled. Such action is respectfully requested.

Respectfully submitted,



Richard S. Roberts  
Attorney for Appellant  
Registration No. 27,941  
P.O. Box 484  
Princeton, New Jersey 08542  
Tel: 609-921-3500  
FAX: 609-921-9535  
Date: July 13, 2006

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage pre-paid in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on July 13, 2006.



Richard S. Roberts

## 8. CLAIMS APPENDIX

1. An abrasion-resistant skirt material for use with air cushion vehicles having at least one air chamber, said skirt material comprising:

- (b) a woven fabric base, comprising yarns of an ultra-high molecular weight polyethylene;
- (b) a bonding layer, comprising a thermoplastic material bonded to the fabric base; and
- (c) an outer layer, comprising a rubber compound bonded to the bonding layer.

2. The skirt material of Claim 1 wherein the rubber compound is selected from the group of compounds consisting of natural rubber and styrene butadiene; natural rubber and polybutadiene; and natural rubber, styrene butadiene, and styrene polybutadiene.

3. The skirt material of Claim 2 wherein the outer layer is between about 5 mils and 50 mils thick.

4. The skirt material of Claim 3 wherein the outer layer is about 30 mils thick.

5. The skirt material of Claim 1 wherein the base fabric is coated on each side with the bonding layer and the rubber compound.

6. The skirt material of Claim 1 wherein the fabric base weighs between about 5 and 11 ounces per square yard, comprises between about 17 ends and 35 ends per inch in both warp and fill directions, and wherein each of the warp and fill ends are between about 650 and 1200 denier.

7. The skirt material of Claim 1 wherein the thermoplastic material is formed of an olefin polymer or copolymer having a melting point less than about 140 degrees C.

8. The skirt material of Claim 7 wherein the thermoplastic material is selected from the group consisting of polyethylene, ethylene vinyl acetate, and combinations thereof.
9. The skirt material of Claim 1 which, when tested in accordance with the Taber Abrasion Resistance Test (H-18 Wheel and 1000g load) retains at least about 98 percent of its original weight after 5,000 abrasion cycles.
10. The skirt material of Claim 1 which, when tested in accordance with the Taber Abrasion Resistance Test (H-18 Wheel and 1000g load) retains at least about 95 percent of its original weight after 10,000 abrasion cycles.
11. The skirt material of Claim 1 which, when tested in accordance with the Taber Abrasion Resistance Test (H-18 Wheel and 1000g load) retains at least about 90 percent of its original weight after 40,000 abrasion cycles.
12. The skirt material of Claim 2 wherein the rubber compound comprises about 80 percent by weight natural rubber and about 20 percent by weight styrene butadiene.
13. The skirt material of Claim 2 wherein the rubber compound comprises about 75 percent natural rubber and about 25 percent polybutadiene.
14. The skirt material of Claim 2 wherein the rubber compound comprises about 66 percent natural rubber, 14 percent styrene butadiene, and 20 percent polybutadiene.
15. A lightweight, abrasion-resistant sheet material, comprising:
  - (a) a woven fabric base, comprising yarns of an ultra-high molecular weight polyethylene;
  - (b) a bonding layer, comprising a thermoplastic material bonded to the fabric base; and
  - (c) an outer layer, comprising a rubber compound bonded to the bonding layer.

16. The abrasion-resistant sheet material of Claim 15 wherein the rubber compound is selected from the group consisting of natural rubber and styrene butadiene; natural rubber and polybutadiene; and natural rubber, styrene butadiene, and polybutadiene.

17. The abrasion-resistant sheet material of Claim 15 wherein the outer layer is between about 5 mils and 50 mils thick.

18. The abrasion-resistant sheet material of Claim 17 wherein the outer layer is about 30 mils thick.

19. The abrasion-resistant sheet material of Claim 15 wherein the fabric base is coated on each side with the bonding layer and the durable rubber layer.

20. The abrasion-resistant sheet material of Claim 15 wherein the fabric base weighs between about 5 and 11 ounces per square yard, comprises between about 17 ends and 35 ends per inch in both the warp and fill directions, and wherein each of the warp and fill ends are between about 650 and 1200 denier.

21. The abrasion-resistant sheet material of Claim 15 wherein the thermoplastic material is formed of an olefin polymer or copolymer having a melting point less than about 140 degrees C.

22. The abrasion-resistant sheet material of Claim 21 wherein the thermoplastic material is selected from the group consisting of polyethylene, ethylene vinyl acetate, and combinations thereof.

23. The abrasion-resistant sheet material of Claim 16 wherein the rubber compound comprises about 75 percent natural rubber and 25 percent polybutadiene.

24. The abrasion-resistant sheet material of Claim 16 wherein the rubber compound comprises about 66 percent natural rubber, 14 percent styrene butadiene, and 20 percent polybutadiene.

25. The abrasion-resistant sheet material of Claim 16 wherein the rubber compound comprises about 80 percent by weight natural rubber and about 20 percent by weight styrene butadiene.

26. The abrasion-resistant sheet material of Claim 15 which, when tested in accordance with the Taber Abrasion Resistance Test (H-18 Wheel and 1000g load) retains at least about 98 percent of its original weight after 5,000 abrasion cycles.

27. The abrasion-resistant sheet material of Claim 15 which, when tested in accordance with the Taber Abrasion Resistance Test (H-18 Wheel and 1000g load) retains at least about 95 percent of its original weight after 10,000 abrasion cycles.

28. The abrasion-resistant sheet material of Claim 15 which, when tested in accordance with the Taber Abrasion Resistance Test (H-18 Wheel and 1000g load) retains at least about 90 percent of its original weight after 40,000 abrasion cycles.

29. (Withdrawn) A method for forming an abrasion-resistant sheet material, the method comprising the steps of:

(a) overlaying a layer of an uncured rubber to a coated fabric, the coated fabric comprising:

(i) an inner fabric base layer comprising yarns of an ultra-high weight average molecular weight polyethylene polymer;

(ii) an outer bonding layer comprising a thermoplastic material bonded to the inner fabric base layer; and

(b) heating the uncured rubber and coated fabric at a sufficient temperature and for a sufficient length of time so as to bond the layer of uncured rubber compound to the thermoplastic material and to cure the rubber compound.

30. (Withdrawn) The method of Claim 29 further comprising the step of rolling the layer of uncured rubber coated fabric into a wound bundle before heating the rubber layer compound and coated fabric.

31. (Withdrawn) The method of Claim 30 further comprising the step of continuously rotating the wound bundle during the heating of the rubber and coated fabric.

32. (Withdrawn) The method of Claim 29 further comprising the step of tacking the coated fabric and the uncured rubber layer together so as to be lightly adhered prior to the step of heating the rubber layer and coated fabric.

33. (Withdrawn) The method of Claim 30 further comprising the step of providing a release paper in said wound bundle so as to provide separation between layers in the bundle.

34. (Withdrawn) The method of Claim 29 wherein the uncured rubber layer has a thickness of between about 5 mils and 50 mils.

35. (Withdrawn) The method of Claim 29 wherein said thermoplastic film is comprised of the material selected from the group consisting of low density polyethylene and ethylene vinyl acetate.

36. (Withdrawn) The method of Claim 29 wherein said thermoplastic film has a thickness between about 7 mils and 15 mils.



37. (Withdrawn) The method of Claim 29 wherein the inner fabric base layer weighs between about 5 and 11 ounces per square yard, comprises between about 17 ends and 35 ends per inch in both the warp and fill directions, and wherein each of the warp and fill ends are between about 650 and 1200 denier.

38. (Withdrawn) The method of Claim 29 wherein the rubber comprises about 80 percent by weight natural rubber and about 20 percent by weight styrene butadiene.

39. (Withdrawn) The method of Claim 29 wherein the heating of the uncured rubber layer and coated fabric is conducted at a temperature between about 230°F and 280°F (about 110°C and 138°C).

40. (Withdrawn) The method of Claim 39 wherein the heating of the uncured rubber layer and coated fabric is conducted at a temperature of about 273°F (about 134°C).

41. (Withdrawn) The method of Claim 29 wherein the heating of the uncured rubber layer and coated fabric is conducted for between about 4 hours and about 24 hours.

9. EVIDENCE APPENDIX

None.

10. RELATED PROCEEDINGS INDEX

None.

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☒ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☒ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☒ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**